

Comments on
Rule Making Proposal, RM-11306
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SUMMARY

I am opposed to the proposed rule-making petition and urge the Commission to dismiss it in its entirety. This petition is not necessary and it would seriously restrict the Amateur Service in the adoption and development of new communications techniques.

There certainly is a need to modify the way communications is regulated in the amateur bands since it has been over 15 years since the last significant changes were made in Part 97 rules. In the short term, this proposal would expand phone use in to much underused portions of the CW band. However, while the proposed rule changes would facilitate some currently implemented digital systems, it would prevent the development of more advanced digital and wider bandwidth systems.

This proposal, while extensive and complicated in scope, seems to be poorly justified on technical bases and there is no compelling reason for it on operational or other grounds. Also, there is no consideration of any future advanced communication techniques, such as spread spectrum, which are currently discouraged by regulations, that could be adopted in practical form, sometime in the future.

The proposal seeks to modify current rules to expand semi-automatic operation of data communications. The changes support a data communications system where a number of channels are scanned until the sender initiates communications. The proposed control scheme called "listen-before-transmit" is inadequate to prevent interference in a mixed mode situation. The same scheme, under interference conditions, will degrade the performance of the data communications unless exclusive channels are assigned to the system. The proposed changes for data communications control are not necessary and would be disruptive to many other modes of communication.

Voluntary methods of coordination, using frequency segregation, time sharing, synchronization and power control, would be a better way to solve the problems without the unnecessary complications of regulation. Voluntary methods have already been used successfully but their use could be expanded and their efficacy improved.

Much of the justification for bandwidth restrictions comes from differing sources whose underlying technical methods are open to question or are inconsistent. In other cases, data, assumptions and

conclusions have been included that seem to be inappropriate for the amateur case. This seriously undermines reasons for the proposed changes.

The Commission should pursue a simple, more flexible approach, possibly using Industry Canada style guidelines for bandwidth. This would allow forward-looking rule changes that would accommodate future technology.

DISCUSSION

Like it or not, the world is turning digital for all communications including data, voice and image. Digitally encoded signals provide a flexibility that breaks the barrier between different types of information so that it no longer matters whether it is voice, data or image. It also affords easy scaling of power and bandwidth.

Radio communication is probably the last place to turn digital because of the difficult nature of the propagating medium. Nevertheless, digital transmission is arriving slowly but steadily, although analog communications techniques will be with us for some years to come.

Advances in radio receiver technology, such as adaptive antenna nulling and digital signal processing(DSP), have made possible new methods of interference reduction. Similarly, advances in inexpensive personal computer technology, via computer sound card interfaces as well as dedicated DSP hardware now allow quick introduction and experimentation with new digitally transmitted modes.

Under the current rules which segregate the mode by type of information, such as data, phone and image, there now exist several conflicting situations that would ordinarily cause severe interference. For example, Slow Scan Television(SSTV) is assigned to the phone portions of the band yet it causes severe interference to Single Side Band (SSB) signals. Full carrier, double sideband, amplitude modulation (AM) is also permitted in the phone band although it also causes interference by the heterodyne between its carrier and the beat frequency oscillator (BFO) in an SSB receiver. Both these situations are currently handled by voluntary segregation into separate areas of the phone band. In the case of SSTV this is usually one or two 3 kHz voice channels. For AM, operation is restricted to a segregated area of the band where operation is voluntarily restricted.

There are also conflicts in existing rules that prevent certain modes such as automatic link establishment (ALE) in data mode and narrow band TV(NBTV) as is now used in Europe. ALE is a mixed SSB voice, automatic link sounding, selective call, and short data communications mode developed by government and used by amateurs on amateur bands. Currently, all ALE data communications must be done in the data/CW portion of the band while selective calling can be done

in the phone band. The proposed rule changes will allow full data/voice ALE capability within the part of the band where phone emissions are allowed.

NBTV is a wideband image communications mode that existing restrictions on image communications bandwidth prohibit. NBTV would still be prohibited under this proposal.

Contrary to popularly held belief, narrowband and wideband communications modes are not necessarily incompatible. Many amateurs base this idea on an assumption of an interference-free or error-free communications channel that is just not practical given the shared nature of our amateur bands. There also exist today, many new techniques, such as adaptive DSP filters and antenna nulling techniques that can mitigate the interference.

In a similar way, digital and analog transmission techniques are usually assumed to be incompatible. However, tests on MARS frequencies using a 63 multiple tone (MT63) data transmission, concurrent with SSB voice, have proven that both voice and data can be transmitted successfully on the same channel. Such tests of voice and data on the same channel are currently prohibited by the rules in the amateur bands.

Digitally encoded voice, transmitted using multiple carriers, using techniques such as Digital Radio Mondial (DRM) or APCO-25 are probably incompatible with analog SSB voice. Likewise, certain spread spectrum transmissions, should they ever be allowed on a practical basis, could behave similarly. It is likely that these types of digital techniques will cause interference to analog communications yet they are more susceptible themselves to interference from SSB and CW signals. Again, voluntary frequency separation, as currently practiced today for SSTV and AM, and voluntary adaptive power control would be the best way to regulate these situations.

This proposal does not address any voluntary methods of coordination using, power control, digital coding, frequency/distance separation or time synchronization. These are in addition to the currently available interference mitigation techniques that could be implemented in hardware and software.

Also proposed are changes to the rules for automatic and semi-automatic operation of stations using data communications. These rule changes would implicitly facilitate a current message switched (store and forward) data communication system called Winlink 2000 that holds some promise for emergency communications. While the system does work, it uses many sets of channels, some up to voice bandwidth, which are scanned in an inefficient way. The proposed rule changes would not promote the efficient use of the channels unless the network uses a better system of control or synchronization.

Under the proposed changes to automatic operation, lower bandwidth, automatic data transmissions

would be allowed in the existing subbands and semi-automatic operation they would be allowed anywhere in the bands. The proposal refers to a control scheme called "listen-before-transmit" as a way of controlling channel usage. Depending on the vagaries of propagation, relative distance between stations and the threshold level of signal detection, this is a crude and ineffective method of control. This method of control is not practical on the same channel shared by other modes.

Many of the other rule changes related to the segregation of higher bandwidth data communications signals also seem to be to the benefit of Winlink 2000, exclusively. As currently configured, Winlink 2000 uses an proprietary modem at the link layer to transmit data over a channel with up to a 3.0 kHz bandwidth using a standard SSB radio transceiver. At higher layers it uses a combination of standard internet protocol, commercial operating system and proprietary software that run on standard personal computer hardware. If the rule changes result in a preference for this system it could cripple further development of alternative, better or non-proprietary systems.

Some of the justification for the proposed bandwidth limits is through estimates of the bandwidth of existing communications modes. The sources of these estimates and the methods used to obtain them seem to differ considerably between sources. For example, the table entitled "IF filter specifications for terrestrial land mobile receivers" is inappropriate in the amateur situation since it applies only to very specific mobile communication systems. This information would not apply to existing amateur communications modes including satellite, meteor and tropo-scatter, earth-moon-earth or any other techniques yet to be invented.

A better solution would be to use one of the common bandwidth estimating techniques, already in use in international radio regulations, such as Carson's rule for narrowband FM emissions. Similar systems exist or can be adapted to amplitude or phase modulated signals and multiple carrier systems, as desired to give consistent bases for future rulemaking.

A bandwidth restriction is proposed for double sideband AM of 9.0 kHz, or +/- 4.5 kHz of the of the highest modulating frequency. The source of this standard is attributed to the ARRL but it is in fact a close copy of existing international shortwave broadcast regulations for bandwidth. While this restriction would be appropriate for a fixed assigned 10 kHz broadcast channel, it is unnecessary in the amateur bands. In addition, there are current part 97 rules (97.307(a), Emission standards) that limit emission bandwidth to the minimum necessary. Rather than impose cumbersome new regulations it would be better to prepare guidelines for amateurs on how to observe the existing rule.

